

Claims

1. A loudspeaker comprising:

a magnetic circuit having a magnetic gap;

a frame coupled to the magnetic circuit;

5 a voice coil having a first end positioned in the magnetic gap and a second end opposite to the first end, the voice coil having a center axis provided through the first end and the second end; and

10 a diaphragm coupled to the second end of the voice coil and the frame, the diaphragm having a first portion in which the center axis of the voice coil is provided, the first portion of the diaphragm being provided inside the voice coil, the diaphragm further having a second portion outside the voice coil,

15 wherein one of the first portion and the second portion of the diaphragm has a cross section in a plane including the center axis, and the cross section of the one of the first portion and the second portion of the diaphragm has an elliptic-arc shape.

2. The loudspeaker according to claim 1, wherein other of the first portion and the second portion of the diaphragm includes

20 a third portion having a cross section in the plane including the center axis, the cross section of the third portion including a first arc, and

25 a fourth portion having a cross section in the plane including the center axis, the cross section of the fourth portion including a second arc having a radius larger than a radius of the first arc, the fourth portion adjoining the third portion and being farther from the second end of the voice coil than the third portion.

3. The loudspeaker according to claim 1, wherein other of the first portion and the second portion of the diaphragm has a cross section in the plane including the center axis, and the cross section of the other of the first portion and the second portion of the diaphragm has an elliptic-arc shape.

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4. The loudspeaker according to claim 1, wherein the diaphragm comprises resin material.

5. The loudspeaker according to claim 1, wherein the diaphragm
10 further has a guide coupled with the second end of the voice coil.

6. The loudspeaker according to claim 1, wherein the diaphragm has a groove to which the second end of the voice coil is inserted.

15 7. The loudspeaker according to claim 1, wherein the first portion of the diaphragm has a dent formed therein.

8. A loudspeaker comprising:

a magnetic circuit having a magnetic gap;

20 a frame coupled to the magnetic circuit;

a voice coil having a first end positioned in the magnetic gap and a second end opposite to the first end, the voice coil having a center axis provided through the first end and the second end; and

25 a diaphragm coupled to the second end of the voice coil and the frame, the diaphragm having a first portion in which the center axis of the voice coil is provided, the first portion of the diaphragm being provided inside the voice coil, the diaphragm further having a second portion outside the

voice coil,

wherein one of the first portion and the second portion of the diaphragm includes

5 a third portion having a cross section in a plane including the center axis, the cross section of the third portion including the first arc, and

10 a fourth portion having a cross section in the plane including the center axis, the cross section of the fourth portion including a second arc having a radius larger than a radius of the first arc, the fourth portion adjoining the third portion and being farther from the second end of the voice coil than the third portion.

9. The loudspeaker according to claim 8, wherein the other of the first portion and the second portion of the diaphragm includes

15 a fifth portion having a cross section in the plane including the center axis, the fifth portion including a third arc, and

20 a sixth portion having a cross section in the plane including the center axis, the sixth portion including a fourth arc having a radius larger than a radius of the third arc, the sixth portion adjoining the fifth portion and being farther from the second end of the voice coil than the fifth portion.

10. The loudspeaker according to claim 8, wherein the diaphragm comprises resin material.

25 11. The loudspeaker according to claim 8, wherein the diaphragm further has a guide coupled to the second end of the voice coil.

12. The loudspeaker according to claim 8, wherein the diaphragm has a groove to which the second end of the voice coil is inserted.

13. The loudspeaker according to claim 8, wherein the first portion of
5 the diaphragm has a dent formed therein.

14. A loudspeaker comprising:

a magnetic circuit having a magnetic gap;

a frame coupled to the magnetic circuit;

10 a voice coil having a first end positioned in the magnetic gap and a second end opposite to the first end, the voice coil having a center axis provided through the first end and the second end; and

15 a diaphragm coupled to the second end of the voice coil and the frame, the diaphragm has a portion in which the center axis of the voice coil is provided, the portion of the diaphragm being provided inside the voice coil, wherein the diaphragm has a non-circular outer shape, and wherein the portion of the diaphragm has a dent formed therein.

16. The loudspeaker according to claim 14, wherein the diaphragm has
20 an elliptical outer shape.

17. The loudspeaker according to claim 14, wherein the diaphragm has
25 an oval outer shape.

18. The loudspeaker according to claim 14, wherein the diaphragm has
30 a rectangular outer shape.

18. An apparatus comprising:

the loudspeaker according to any one of claims 1 to 17; and
a member coupled to the loudspeaker.

5 19. The apparatus according to claim 18, wherein the member is an
electronic circuit.